

150 kVA 3-phase SiC Power Stack Reference Design

SOLUTIONS FOR POWER MANAGEMENT

STACK REFERENCE CUT SHEET

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Mersen SiC Power Stack reference designs help inverter designers save time and confusion in selecting individual components and can greatly benefit from a solution that is optimally pre-designed for their specific application.

FEATURES

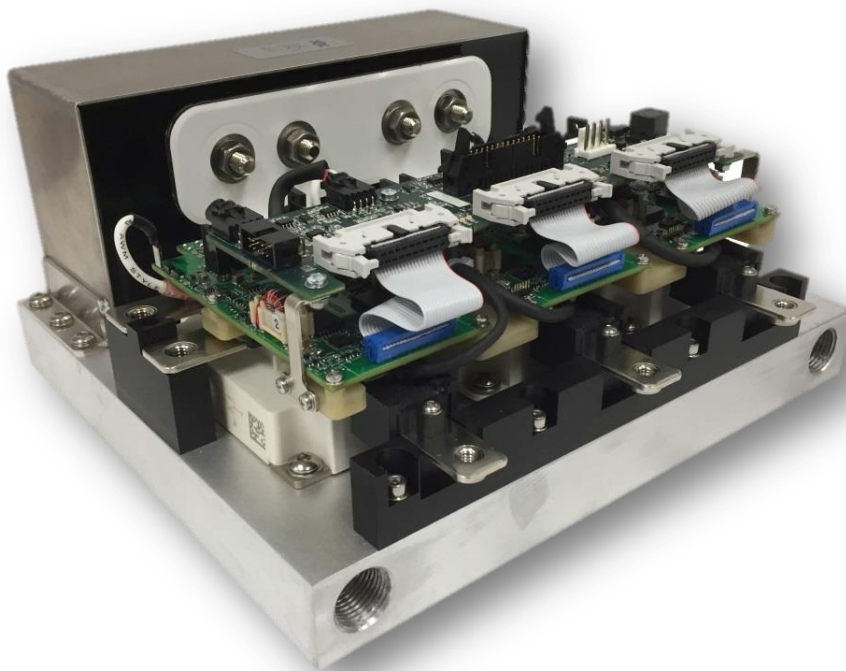
- 16 kW/L power density
- Up to 130°C T_j
- Peak efficiency 98%
- Wolfspeed® SiC MOSFETs CAS300M12BM2
- or Semikron® SiC MOSFETs SKM350MB120SCH17
- AgileSwitch 62EM1 Gate Driver
- 700 V_{DC} / 200 A_{RMS}
- Compact water cooled
- Up to 20 kHz switching Frequency

BENEFITS

- Power modules, Bus bar, Cooling, Gate drivers and Capacitors can now be optimally designed together in one step to answer electrical, mechanical and thermal challenges of the system.

APPLICATIONS

- EV or HEV heavy-duty vehicle
- E-Mobility



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TECHNICAL SPECIFICATIONS

Electrical		Min	Typ.	Max	Unit
Modules	3x Wolfspeed® SiC MOSFETs and Diodes in Dual Device CAS300M12BM2				
Vo	Three Phase Output Voltage, Vdc > 700V		480		V _{RMS}
Io	Flow: 4 l/min, Coolant: 50% Water/50% Glycol, Tcoolant = 70 C, Vdc = 700V, fsw = 15kHz		200		A _{RMS}
Vdc	DC Bus Voltage/ DC Supply Voltage		700	800	V
fsw	Switching frequency, PWM type	10	15	20	kHz
Cdc	DC Link Capacitor, 760uF, 1100V	0.65	0.7	0.75	mF
Cdd	EMC decoupling capacitors		0.68		µF
Viso	Power Terminals to chassis, DC, 1 min		3000	4000	V

Cooling and Environment		Min	Typ.	Max	Unit
Tsto	Storage Temperature	-40		85	°C
Tair	Ambient air temperature	-40		65	°C
T coolant	Coolant inlet temperature, derate > 70 °C	-40		105	°C
IP	Inclosure Ingress Protection		IP00		
dp	Pressure Drop, nominal flow 4 ltr/min		29		mbar
P	Power dissipated to liquid coolant		2400	3000	W
Altitude	Vdc = 800V			4000	m
Humidity	No condensation, Pollution Degree 2	5		85	%

Discharge of DC Bus (Optional)		Min	Typ.	Max	Unit
tdis	No active discharge to Vdc < 50V			30	min
tadis	With active discharge to Vdc < 50V			5	S

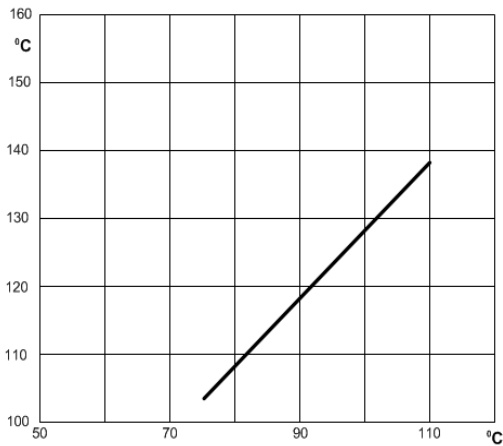
Control Interface	
Gate Driver	AgileSwitch 62EM1 - Programmable 62mm Electrical Series. AAS2X3 Stack Electronics

Mechanical		Min	Typ.	Max	Unit
Height			131		mm
Length			272		mm
Width			259		mm
Weight	Average value		18		kg
Tt	Fastener torque for power terminals		TBD		Nm
T1	Torque for TBD		TBD		Nm
Vibration	According to IEC60721			5	m/s ²
Shock	According to IEC60721			40	m/s ²

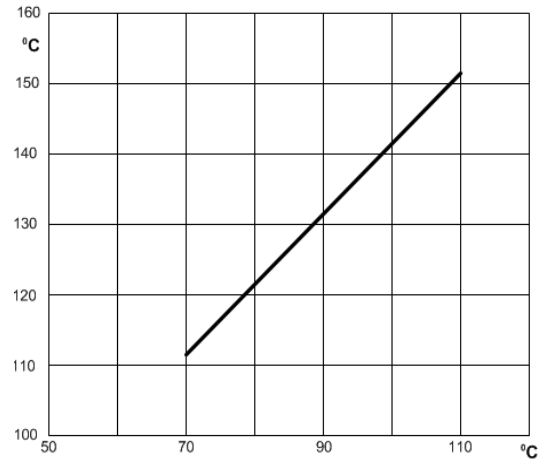
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COOLING PERFORMANCE

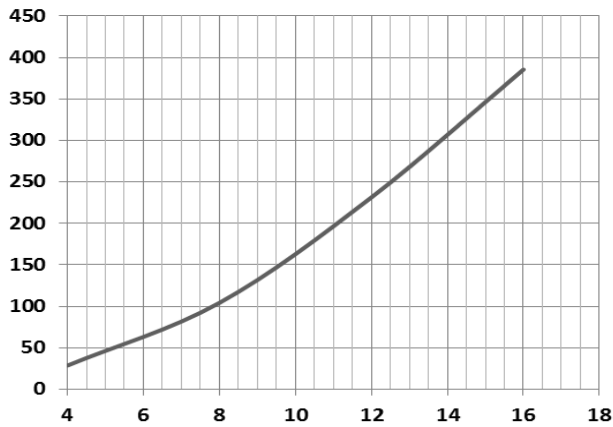
FET T_j vs Coolant inlet Temperature.
R_{th} = .012 K/W, I_o = 200A, f_{sw} = 15 kHz



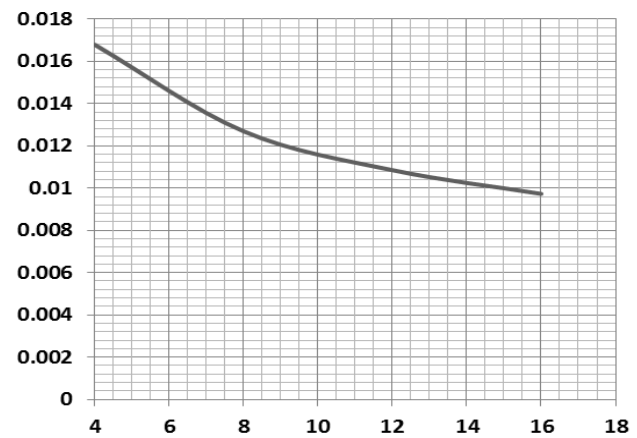
FET T_j vs Coolant inlet Temperature.
R_{th} = .0168 K/W, I_o = 200A, f_{sw} = 15 kHz



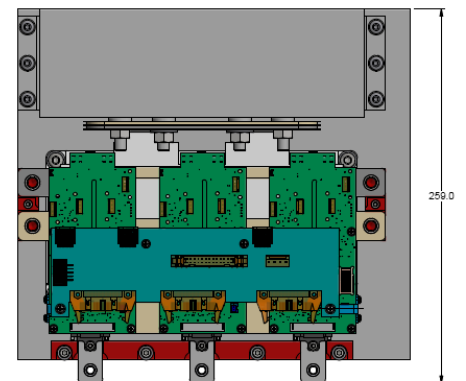
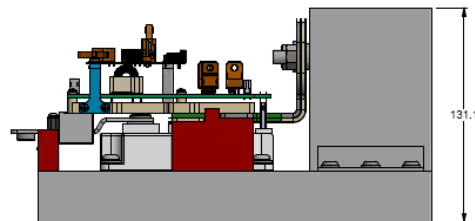
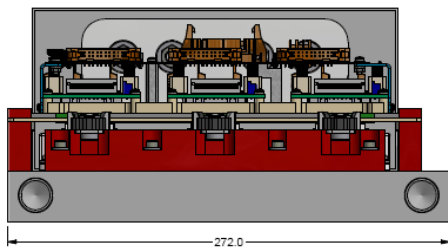
Pressure Drop, mBar, vs Flow Rate, liters/min



Cold Plate R_{th}, °C/W, vs Flow Rate, liters/min

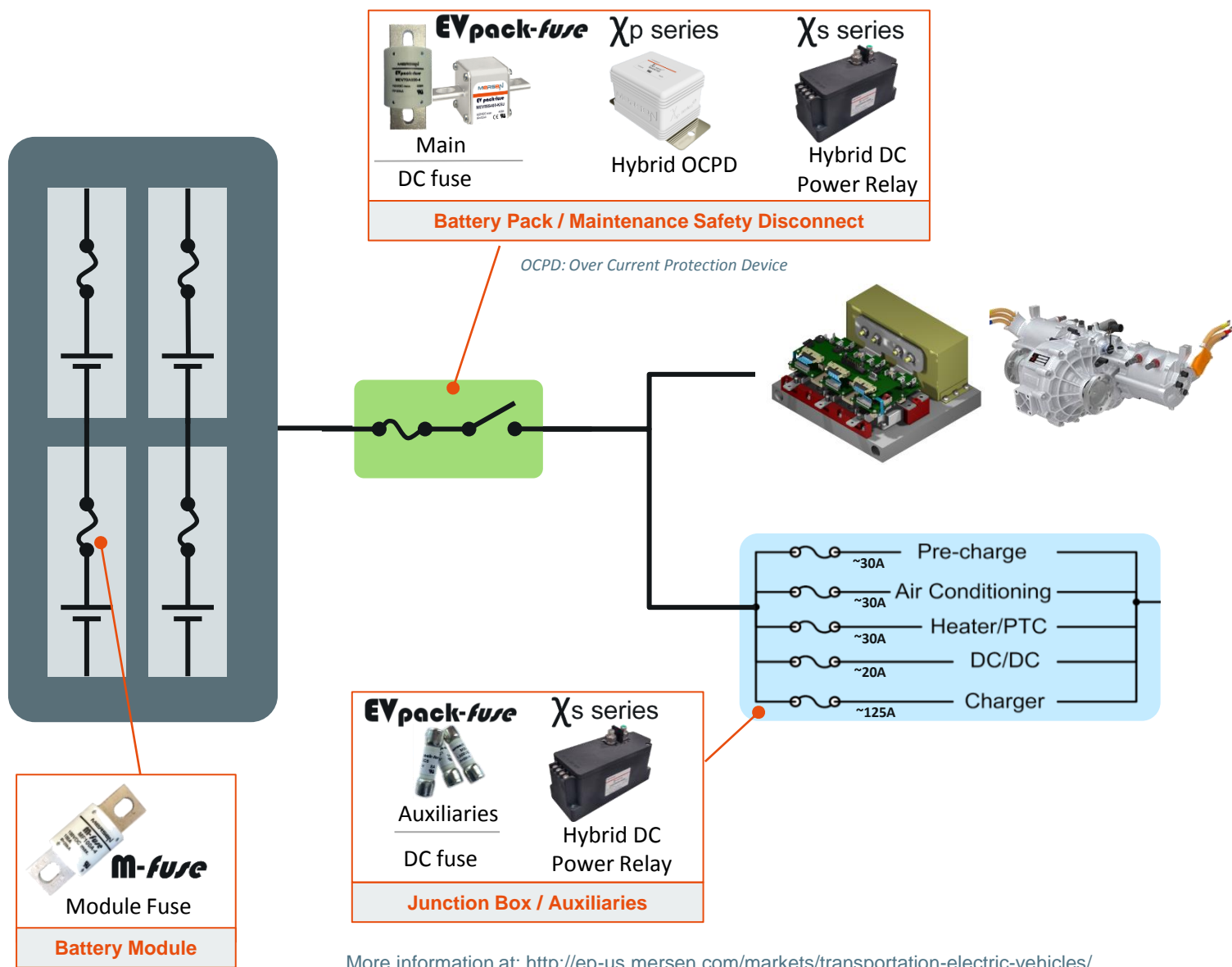


DIMENSIONS



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TYPICAL DC PROTECTION SCHEME



More information at: <http://ep-us.mersen.com/markets/transportation-electric-vehicles/>

Reference designs can be supported by purchasing individual components and additionally Mersen provides assembly services.

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